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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/605,303	09/22/2003	TZU-CHING TSAI	11080-US-PA	2302

31561 7590 06/29/2004

JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE
7 FLOOR-1, NO. 100
ROOSEVELT ROAD, SECTION 2
TAIPEI, 100
TAIWAN

EXAMINER
ESTRADA, MICHELLE

ART UNIT	PAPER NUMBER
2823	

DATE MAILED: 06/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/605,303	TSAI ET AL.	
	Examiner	Art Unit	
	Michelle Estrada	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-20 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-20 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☒ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 5, 6, 10-13 and 20 are rejected under 35 U.S.C. 102(e) as being anticipated by Steck et al. (6,750,096).

With respect to claims 1 and 13, Steck et al. disclose providing a substrate (2), wherein the substrate is already formed with a deep trench (1) (Col. 4, lines 15-17); forming a doped layer (3) on a surface at a bottom of the deep trench and forming a material layer (12) on the doped layer; forming a passivation layer (8/10) on a sidewall of the deep trench that is not covered by the material layer (See fig. 5); removing the material layer (See fig. 6); performing a thermal process to drive-in dopants in the doped layer to the substrate to form a doped region and concurrently inducing a reaction between the doped layer and the substrate to form an oxide layer (Col. 4, lines 64-67 and Col. 5, lines 22-24); and removing the oxide layer (Col. 6, lines 65-67).

With respect to claim 5, Steck et al. disclose forming a conformal passivation layer above the substrate and on the surface of the deep trench, covering the material layer and the doped layer; and etching back the conformal passivation layer to form the

passivation layer on the sidewall of the deep trench that is not covered by the material layer (See figs. 5 and 6).

With respect to claim 6, Steck et al. disclose wherein forming the conformal passivation layer comprises performing a deposition process (Col. 5, lines 19-21).

With respect to claim 10, Steck et al. disclose forming a conformal doped layer above the substrate and on the surface of the deep trench; filling the material layer in the deep trench, wherein the material layer does not completely fill the deep trench; and removing the conformal doped layer that is not covered by the material layer (See figs. 1 and 2).

With respect to claim 11, Steck et al. disclose wherein the material comprises polysilicon (12).

With respect to claims 12 and 20, Steck et al. disclose wherein the doped layer comprises a silicate glass layer doped with arsenic ions (Col. 2, lines 51-53).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2-4, 8, 9, 14-17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Steck et al. as applied to claims 1, 5, 6, 10-13 and 20 above, and further in view of the following comments.

With respect to claims 2 and 14, it is obvious that Steck et al. use oxygen gas in the thermal process because an oxide of 5 nm is being formed during the thermal process (Col. 5, lines 23-25). It would have been within the scope of one of ordinary skill in the art to use oxygen during the thermal process in order to form the oxide layer that is 5 nm in thickness.

With respect to claims 3 and 15, Steck et al. disclose wherein the thermal process is conducted at a temperature of approximately 1000 °C, which overlaps the recited range (Col. 4, lines 64-65).

With respect to claims 2 and 14, one of ordinary skill in the art would have been led to the recited flow rate of oxygen to routine experimentation to achieve a desire oxide thickness in view of the range of values disclosed.

With respect to claims 4 and 16, one of ordinary skill in the art would have been led to the recited duration of time for the thermal process to routine experimentation to achieve a desire rate of heating in view of the range of values disclosed.

With respect to claims 8 and 19, one of ordinary skill in the art would have been led to the recited thickness of the passivation layer to routine experimentation to achieve a desire device dimension, device associated characteristics and device density on the finished wafer in view of the range of values disclosed.

With respect to claims 9 and 17, one of ordinary skill in the art would have been led to the recited thickness of the substrate that is being consumed during the reaction between the doped layer and the substrate to routine experimentation to achieve a desire device dimension, device associated characteristics and device density on the finished wafer in view of the range of values disclosed.

In addition, the selection of temperature, flow rate of oxygen, time and thickness, its obvious because it is a matter of determining optimum process conditions by routine experimentation with a limited number of species of result effective variables. These claims are prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also In re Huang, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996)(claimed ranges or a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also In re Boesch, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill or art) and In re Aller, 105 USPQ 233 (CCPA 1995) (selection of optimum ranges within prior art general conditions is obvious).

Note that the specification contains no disclosure of either the critical nature of the claimed temperature, flow rate of oxygen, time and thickness or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen temperature, flow rate of oxygen, time and thickness or upon another variable

recited in a claim, the Applicant must show that the chosen [dimensions] are critical. *In re Woodruf*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Claims 7 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Steck et al. and comments as applied to claims 2-4, 8, 9, 14-17 and 19 above, and further in view of Tews (6,534,376).

The combination does not disclose wherein the passivation layer is formed with a material that includes silicon nitride.

Tews disclose forming a passivation layer (128) which is silicon nitride on a sidewall of the deep trench (113) that is not covered by the material layer (124); and removing the material (124) (See figs. 7 and 8 and Col. 5, lines 44-48).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of the combination and Tews to enable the formation of the passivation layer of the combination to be performed according to the teachings of Tews because one of ordinary skill in the art would have been motivated to look to alternative suitable methods of performing the disclosed formation of the passivation layer of the combination and art recognized suitability for an intended purpose has been recognized to be motivation to combine. See MPEP 2144.07.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Estrada whose telephone number is 571-272-1858. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-2800.

George Hourson
Primary Examiner
Art Unit 2823

MEstrada
June 28, 2004